

**INNOVATIVE CENTRE**

# HEADINGS COLLECTION



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## Questions 14-20

Reading Passage 2 has seven paragraphs, A-H.

Choose the correct heading for paragraphs A and C-H from the list of headings below.

Write the correct number. i-ri, in boxes 14-20 on your answer sheet.

### List of Headings

- i Scientists' call for a revision of policy
- ii An explanation for reduced water use
- iii How a global challenge was met
- iv Irrigation systems fall into disuse
- v Environmental effects
- vi The financial cost of recent technological improvements
- vii The relevance to health
- viii Addressing the concern over increasing populations
- ix A surprising downward trend in demand for water
- x The need to raise standards
- xi A description of ancient water supplies

14 Paragraph A    **xi**

### Example:

**Paragraph B    Answer - iii**

15 Paragraph C    **vii**

16 Paragraph D    **v**

17 Paragraph E

18 Paragraph F    **ix**

19 Paragraph G    **ii**

20 Paragraph H    **X**

# MAKING EVERY DROP COUNT

## A

The history of human civilization is entwined with the history of ways we have learned to manipulate water resources. As towns gradually expanded, water was brought from increasingly remote sources, leading to sophisticated engineering efforts such as dams and aqueducts. At the height of the Roman Empire, nine major systems, with an innovative layout of pipes and well-built sewers, supplied the occupants of Rome with as much water per person as is provided in many parts of the industrial world today.

## B

During the industrial revolution and population explosion of the 19th and 20th centuries, the demand for water rose dramatically. Unprecedented construction of tens of thousands of monumental engineering projects designed to control floods, protect clean water supplies, and provide water for irrigation and hydropower brought great benefits to hundreds of millions of people. Food production has kept pace with soaring populations mainly because of the expansion of artificial irrigation system that makes possible the growth of 40% of the world's food. Nearly one-fifth of all the electricity generated worldwide is produced by turbines spun by the power of falling water.

## C

Yet there is a dark side to this picture: despite our progress, half of the world's population still suffers, with water services inferior to those available to the ancient Greeks and Romans. As the United Nations report on access to water reiterated in November 2001, more than one billion people lack access to clean drinking water: some two and half billion do not have adequate sanitation services. Preventable water-related diseases kill an estimated 10,000 to 20,000 children every day, and the latest evidence suggests that we are falling behind in efforts to solve their problems.

## D

The consequences of our water policies extend beyond jeopardizing human health. Tens of millions of people have been forced to move from their homes – often with little warning or compensation – to make way for the reservoirs behind dams. More than 20% of all freshwater fish species are now threatened or endangered because dams and water withdrawals have destroyed the free-flowing river ecosystems where they thrive. Certain irrigation practices degrade soil quality and reduce agricultural productivity. Groundwater aquifers\* are being pumped down faster than they are naturally replenished in part of India, China, the USA and elsewhere. And disputes over shared water resources have led to violence and continue to raise local, national and even international tensions.

## **E**

At the outset of the new millennium, however, the way resource planners think about water is beginning to change. The focus is slowly shifting back to the provision of basic human and environmental needs as a top priority – ensuring ‘some for all,’ instead of ‘more for some’. Some water experts are now demanding that existing infrastructure be used in smarter ways rather than building new facilities, which is increasingly considered the option of last, not first, resort. This shift in philosophy has not been universally accepted, and it comes with strong opposition from some established water organizations. Nevertheless, it may be the only way to address successfully the pressing problems of providing everyone with clean water to drink, adequate water to grow food and a life free from preventable water-related illness.

## **F**

Fortunately – and unexpectedly – the demand for water is not rising as rapidly as some predicted. As a result, the pressure to build new water infrastructures has diminished over the past two decades. Although population, industrial output and economic productivity have continued to soar in developed nations, the rate at which people withdraw water from aquifers, rivers and lakes has slowed. And in a few parts of the world, demand has actually fallen.

## **G**

What explains this remarkable turn of events? Two factors: people have figured out how to use water more efficiently, and communities are rethinking their priorities for water use. Throughout the first three-quarters of the 20th century, the quantity of freshwater consumed per person doubled on average; in the USA, water withdrawals increased tenfold while the population quadrupled. But since 1980, the amount of water consumed per person has actually decreased, thanks to a range of new technologies that help to conserve water in homes and industry. In 1965, for instance, Japan used approximately 13 million gallons\* of water to produce \$1 million of commercial output; by 1989 this had dropped to 3.5 million gallons (even accounting for inflation) – almost a quadrupling of water productivity. In the USA, water withdrawals have fallen by more than 20% from their peak in 1980.

## **H**

On the other hand, dams, aqueducts and other kinds of infrastructure will still have to be built, particularly in developing countries where basic human needs have not been met. But such projects must be built to higher specifications and with more accountability to local people and their environment than in the past. And even in regions where new projects seem warranted, we must find ways to meet demands with fewer resources, respecting ecological criteria and to smaller budget.

## Questions 27-30

Reading Passage 3 has six sections, A-F.

Choose the correct heading for sections B, C, E and F from the list of headings below.

Write the correct number, i-xi, in boxes 27-30 on your answer sheet.

### List of Headings

- i MIRTP as a future model
- ii Identifying the main transport problems
- iii Preference for motorised vehicles
- iv Government authorities' instructions
- v Initial improvements in mobility and transport modes
- vi Request for improved transport in Makete
- vii Transport improvements in the northern part of the district
- viii Improvements in the rail network
- ix Effects of initial MIRTP measures
- x Co-operation of district officials
- xi Role of wheelbarrows and donkeys

#### Example:

**Section A**     **Answer - vi**

27 Section B     ii

28 Section **C**     v

#### Example:

**Section D**     **Answer - ix**

29 Section E     x

30 Section F     i

# Makete Integrated Rural Transport Project

## Section A

The disappointing results of many conventional road transport projects in Africa led some experts to rethink the strategy by which rural transport problems were to be tackled at the beginning of the 1980s. A request for help in improving the availability of transport within the remote Makete District of southwestern Tanzania presented the opportunity to try a new approach.

The concept of 'integrated rural transport' was adopted in the task of examining the transport needs of the rural households in the district. The objective was to reduce the time and effort needed to obtain access to essential goods and services -through an improved rural transport system. The underlying assumption was that the time saved would be used instead for activities that would improve the social and economic development of the communities. The Makete Integrated Rural Transport – Project (MIRT P) started in 1985 with financial support from the Swiss Development Corporation and was coordinated with the help of the Tanzanian government.

## Section B

When the project began Makete District was virtually totally isolated during the rainy season. The regional road was in such bad shape that access to the main towns was impossible for about three months of the year. Road traffic was extremely rare with the district, and alternative means of transport were restricted to donkeys in the north of the district, people relied primarily on the paths, which were supper and dangerous during the rains.

Before solutions could be proposed, the problems had to be understood. Little was known about the transport demands of the rural households, so Phase I, between December 1985 and December 1987, focused on research. The socio-economic survey of more than 400 households in the district indicates that a household in Makete spent, on average, seven hours a day on transporting themselves and their goods, a figure which seemed extreme but which has also been obtained in surveys in other rural areas in Africa. Interesting facts regarding transport were found- 95% was on foot, 80% was within the locality and 70% was related to the collection of water and firewood and travelling to running mills.

## Section C

Having determined the main transport needs, possible solutions were identified which might reduce the time and burden During Phase II. from January to February 1991, a number of approaches were implemented in an effort to improve mobility and access to transport.

An improvement of the rotted network was considered necessary to ensure the import and export of goods to the district. These improvements were carried out using methods that were heavily dependent on labour. In addition to the improvement of roads, these methods provided training in the operation of a mechanical workshop and bus and truck services.

However, the difference from the conventional approach was that this time consideration was given to local transport needs outside the road network.

Most goods were transported along the paths that provide shortcuts up and down the hillsides, but the paths were a real safety task and made the journey on foot even more arduous. It made sense to improve the paths by building steps, handrails and footbridges.

It was uncommon to fix the means of transport that were more efficient than walking but less technologically advanced than motor vehicles. The use of bicycles was constrained by their high cost and the lack of available spare parts. Oxen were not used at all but donkeys were used by a few households in the northern part of the district. MIRTP focused on what would be most appropriate for the inhabitants of Makete in terms of what was available, how much they could afford and what they are willing to accept. After careful consideration, the project chose the promotion of donkeys – a donkey costs less than a bicycle – and the introduction of a locally manufacturable wheelbarrow.

#### **Section D**

At the end of Phase II, it was clear that the selected approaches to Makete's transport problems had had different degrees of success. Phase III, from March 1991 to March 1993, focused on the refinement and most of these activities.

The road improvements and accompanying maintenance system had helped make the district centre accessible throughout the year. Essential goods from outside the district had become more readily available at the market and prices did not fluctuate as much as they had done before.

Paths and secondary roads were improved only at the request of communists who were willing to participate in construction and maintenance. However, the improved paths impressed the inhabitants, and requests for assistance greatly increased soon after only a few improvements had been completed.

The efforts to improve the efficiency of the existing transport services were not very successful because most of the motorised vehicles in the district broke down and there were no resources to repair them. Even the introduction of low-cost means of transport was difficult because of the general poverty of the district. The locally manufactured wheelbarrows were still too expensive for all but a few of the households. Modifications to the original design by local carpenters cut- production time and costs. Other local carpenters have been trained in the new design So that they can respond to requests. Nevertheless, a locally produced wooden wheelbarrow which costs around 500QTanzanian shillings (less than US\$20) in Makete, and is about one-quarter the cost of a metal wheelbarrow, is still too expensive for most people.



Donkeys, which were imported to the district have become more common and contribute, in particular, to the transportation of crops and goods to market. Those who have bought donkeys are mainly from richer households but with an increased supply through local breeding, donkeys should become more affordable. Meanwhile, local initiatives are promoting the renting out of the existing donkeys. It should be noted, however, that a donkey, which at 20,000 Tanzanian shillings costs less than a bicycle, is still an investment equal to an average household's income over half a year. This clearly illustrates the need for supplementary measures if one wants to assist the rural poor.

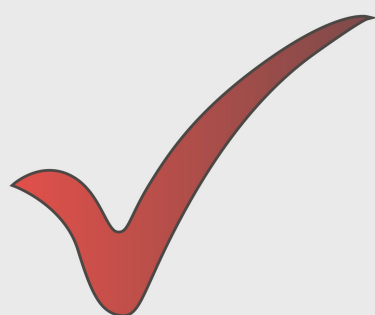
### **Section E**

It would have been easy to criticize the MIRTTP for using in the early phases a top-down approach, in which decisions were made by experts and officials before being handed down to communities, but it was necessary to start the process from the level of the governmental authorities of the district. It would have been difficult to respond to the requests of villagers and other rural inhabitants without the support and understanding of district authorities.

### **Section F**

Today, nobody in the district argues about the importance of improved paths and inexpensive means of transport. But this is the result of dedicated work over a long period particularly from the officers in charge of community development. They played an essential role in raising awareness and interest among the rural communities.

The concept of integrated rural transport is now well established in Tanzania, where a major program of rural transport is just about to start. The experiences from Makete will help in this initiative, and Makete District will act as a reference for future work.



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## Questions 14–19

Reading Passage 2 has seven sections, A–G.

Choose the correct headings for sections A–F from the list of headings below.

Write the correct number, i–x, in boxes 14–19 on your answer sheet.

### List of Headings

- i The results of the research into blood-variants
- ii Dental evidence
- iii Greenberg's analysis of the dental and linguistic evidence
- iv Developments in the methods used to study early population movements
- v Indian migration from Canada to the U.S.A.
- vi Further genetic evidence relating to the three-wave theory
- vii Long-standing questions about prehistoric migration to America
- viii Conflicting views of the three-wave theory, based on non-genetic evidence
- ix Questions about the causes of prehistoric migration to America
- x How analysis of blood-variants measures the closeness of the relationship between different populations

14 Section A **iv**

15 Section B **vii**

16 Section C **x**

17 Section D **i**

18 Section E **vi**

19 Section F **ii**

**Example:**

**Section G    Answer - viii**

# Population movements and genetics

**A** Study of the origins and distribution of human populations used to be based on archaeological and fossil evidence. A number of techniques developed since the 1950s however have placed the study of these subjects on a sounder and more objective footing. The best information on early population movements is now being obtained from the archaeology of the living body the clues to be found in genetic material.

**B** Recent work on the problem of when people first entered the Americas is an example of the value of these new techniques. North-east Asia and Siberia have long been accepted as the launching ground for the first human colonisers of the New World<sup>1</sup>. But was there one major wave of migration across the Bering Strait into the Americas, or several? And when did this event, or events, take place? In recent years, new clues have come from research into genetics, including the distribution of genetic markers in modern Native Americans<sup>2</sup>.

**C** An important project, led by the biological anthropologist Robert Williams, focused on the variants (called Gm all types) of one particular protein – immunologic G – found in the fluid portion of human blood. All proteins ‘drift’, or produce variants, over the generations, and members of an interbreeding human population will share a set of such variants. Thus, by comparing the Gm allotypes of two different populations (e.g. two Indian tribes), one can establish their genetic distance, which itself can be calibrated to give an indication of the length of time since these populations last interbred.

**D** Williams and his colleagues sampled the blood of over 5,000 American Indians in western North America during a twenty-year period. They found that their Gm allotypes could be divided into two groups, one of which also corresponded to the genetic typing of Central and South American Indians. Other tests showed that the Inuit (or Eskimo) and Aleut<sup>3</sup> formed a third group. From this evidence, it was deduced that there had been three major waves of migration across the Bering Strait. The first, Paleo – Indian wave more than 15,000 years ago was ancestral to all Central and South American Indians. The second wave, about 14,000-12,000 years ago, brought No-Dene hunters ancestors of the Navajo and Apache (who only migrated south from Canada about 600 or 700 years ago). The third wave perhaps 10,000 or 9,000 years ago saw the migration from Northeast Asia of groups ancestral to the modern Eskimo and Aleut.

**E** How far does other research support these conclusions? Geneticist Douglas Wallace has studied mitochondrial DNA<sup>4</sup> in blood samples from three widely separated Native American groups: Pima- Papago Indians in Arizona, Maya Indians on the Yucatan peninsula, Mexico, and Ticuna Indians in the Upper Amazon region of Brazil. As would have been predicted by Robert Williams’s work, all three groups appear to be descended from the same ancestral (Paleo-Indian) population.

**F** There are two other kinds of research that have thrown some light on the origins of the Native American population; they involve the study of teeth and of languages. The biological anthropologist Christy Turner is an expert in the analysis of changing physical characteristics in human teeth. He argues that tooth crowns and roots<sup>5</sup> have a high genetic component, minimally affected by environmental and other factors. Studies carried out by Turner of many thousands of New and Old World specimens, both ancient and modern, suggest that the majority of prehistoric Americans are linked to Northern Asian populations by crown and root traits such as incisor<sup>6</sup> shoveling (a scooping out on one or both surfaces of the tooth), single-rooted upper first premolars<sup>6</sup> and triple-rooted lower first molars<sup>6</sup>.

According to Turner, this ties in with the idea of a single Paleo-Indian migration out of North Asia, which he sets at before 14,000 years ago by calibrating rates of dental micro-evolution. Tooth analyses also suggest that there were two later migrations of Na-Denes and Eskimo-Aleut.

**G** The linguist Joseph Greenberg has, since the 1950s, argued that all Native American languages belong to a single Amerind family, except for Na-Dene and Eskimo-Aleut – a view that gives credence to the idea of three main migrations. Greenberg is in a minority among fellow linguists, most of whom favor the notion of a great many waves of migration to account for the more than 1,000 – languages spoken at one time by American Indians. But there is no doubt that the new genetic and dental evidence provides strong backing for Greenberg's view. Dates given for the migrations should nevertheless be treated with caution, except where supported by hard archaeological evidence.



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## Questions 14-19

Reading Passage 2 has seven paragraphs, A-G.

Choose the correct heading for paragraphs A and C-G from the list below.

Write the correct number, i-x, in boxes 14–19 on your answer sheet.

### List of Headings

- i Disobeying FAA regulations
- ii Aviation disaster prompts action
- iii Two coincidental developments
- iv Setting altitude zones
- v An oversimplified view
- vi Controlling pilots' licences
- vii Defining airspace categories
- viii Setting rules to weather conditions
- ix Taking off safely
- x First steps towards ATC

14 Paragraph A **ii**

**Example:**

**Paragraph B Answer - x**

15 Paragraph C **iii**

16 Paragraph D **v**

17 Paragraph E **iv**

18 Paragraph F **viii**

19 Paragraph G **vii**

# AIR TRAFFIC CONTROL IN THE USA

## A

An accident that occurred in the skies over the Grand Canyon in 1956 resulted in the establishment of the Federal Aviation Administration (FAA) to regulate and oversee the operation of aircraft in the skies over the United States, which were becoming quite congested. The resulting structure of air traffic control has greatly increased the safety of flight in the United States, and similar air traffic control procedures are also in place over much of the rest of the world.

## B

Rudimentary air traffic control (ATC) existed well before the Grand Canyon disaster. As early as the 1920s, the earliest air traffic controllers manually guided aircraft in the vicinity of the airports, using lights and flags, while beacons and flashing lights were placed along cross-country routes to establish the earliest airways. However, this purely visual system was useless in bad weather, and, by the 1930s, radio communication was coming into use for ATC. The first region to have something approximating today's ATC was New York City, with other major metropolitan areas following soon after.

## C

In the 1940s, ATC centres could and did take advantage of the newly developed radar and improved radio communication brought about by the Second World War, but the system remained rudimentary. It was only after the creation of the FAA that full-scale regulation of America's airspace took place, and this was fortuitous, for the advent of the jet engine suddenly resulted in a large number of very fast planes, reducing pilots' margin of error and practically demanding some set of rules to keep everyone well separated and operating safely in the air.

## D

Many people think that ATC consists of a row of controllers sitting in front of their radar screens at the nation's airports, telling arriving and departing traffic what to do. This is a very incomplete part of the picture. The FAA realised that the airspace over the United States would at any time have many different kinds of planes, flying for many different purposes, in a variety of weather conditions, and the same kind of structure was needed to accommodate all of them.

## E

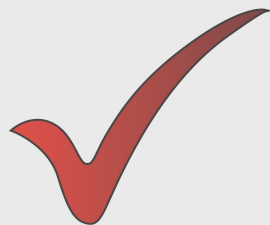
To meet this challenge, the following elements were put into effect. First, ATC extends over virtually the entire United States. In general, from 365m above the ground and higher, the entire country is blanketed by controlled airspace. In certain areas, mainly near airports, controlled airspace extends down to 215m above the ground, and, in the immediate vicinity of an airport, all the way down to the surface. Controlled airspace is that airspace in which FAA regulations apply. Elsewhere, in uncontrolled airspace, pilots are bound by fewer regulations. In this way, the recreational pilot who simply wishes to go flying for a while without all the restrictions imposed by the FAA has only to stay in uncontrolled airspace, below 365m, while the pilot who does want the protection afforded by ATC can easily enter the controlled airspace.

## F

The FAA then recognised two types of operating environments. In good meteorological conditions, flying would be permitted under Visual Flight Rules (VFR), which suggests a strong reliance on visual cues to maintain an acceptable level of safety. Poor visibility necessitated a set of Instrumental Flight Rules (IFR), under which the pilot relied on altitude and navigational information provided by the plane's instrument panel to fly safely. On a clear day, a pilot in controlled airspace can choose a VFR or IFR flight plan, and the FAA regulations were devised in a way which accommodates both VFR and IFR operations in the same airspace. However, a pilot can only choose to fly IFR if they possess an instrument rating which is above and beyond the basic pilot's license that must also be held.

## G

Controlled airspace is divided into several different types, designated by letters of the alphabet. Uncontrolled airspace is designated Class F, while controlled airspace below 5,490m above sea level and not in the vicinity of an airport is Class E. All airspace above 5,490m is designated Class A. The reason for the division of Class E and Class A airspace stems from the type of planes operating in them. Generally, Class E airspace is where one finds general aviation aircraft (few of which can climb above 5,490m anyway), and commercial turboprop aircraft. Above 5,490m is the realm of the heavy jets, since jet engines operate more efficiently at higher altitudes. The difference between Class E and A airspace is that in Class A, all operations are IFR, and pilots must be instrument-rated, that is, skilled and licensed in aircraft instrumentation. This is because ATC control of the entire space is essential. Three other types of airspace, Classes D, C and B, govern the vicinity of airports. These correspond roughly to small municipal, medium-sized metropolitan and major metropolitan airports respectively, and encompass an increasingly rigorous set of regulations. For example, all a VFR pilot has to do to enter Class C airspace is establish two-way radio contact with ATC. No explicit permission from ATC to enter is needed, although the pilot must continue to obey all regulations governing VFR flight. To enter Class B airspace, such as on approach to a major metropolitan airport, an explicit ATC clearance is required. The private pilot who cruises without permission into this airspace risks losing their license.



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## Questions 14-17

Reading Passage 2 has six paragraphs, A-F.

Choose the correct heading for paragraphs B and D-F from the list of headings below.

Write the correct number, I-ix, in boxes 14-17 on your answer sheet.

### List of Headings

- i Predicting climatic changes
- ii The relevance of the Little Ice Age today
- iii How cities contribute to climate change
- iv Human impact on the climate
- v How past climatic conditions can be determined
- vi A growing need for weather records
- vii A study covering a thousand years
- viii People have always responded to climate change
- ix Enough food at last

**Example:**

**Paragraph A      Answer - viii**

14 Paragraph B      **ii**

**Example:**

**Paragraph C      Answer - v**

15 Paragraph D      **vii**

16 Paragraph E      **ix**

17 Paragraph F      **iv**



# THE LITTLE ICE AGE

## A

This book will provide a detailed examination of the Little Ice Age and other climatic shifts, but, before I embark on that, let me provide a historical context. We tend to think of climate – as opposed to weather – as something unchanging, yet humanity has been at the mercy of climate change for its entire existence, with at least eight glacial episodes in the past 730,000 years. Our ancestors adapted to the universal but irregular global warming since the end of the last great Ice Age, around 10,000 years ago, with dazzling opportunism. They developed strategies for surviving harsh drought cycles, decades of heavy rainfall or unaccustomed cold; adopted agriculture and stock-raising, which revolutionised human life; and founded the world's first pre-industrial civilisations in Egypt, Mesopotamia and the Americas. But the price of sudden climate change, in famine, disease and suffering, was often high.

## B

The Little Ice Age lasted from roughly 1300 until the middle of the nineteenth century. Only two centuries ago, Europe experienced a cycle of bitterly cold winters; mountain glaciers in the Swiss Alps were the lowest in recorded memory, and pack ice surrounded Iceland for much of the year. The climatic events of the Little Ice Age did more than help shape the modern world. They are the deeply important context for the current unprecedented global warming. The Little Ice Age was far from a deep freeze, however; rather an irregular seesaw of rapid climatic shifts, few lasting more than a quarter-century, driven by complex and still little understood interactions between the atmosphere and the ocean. The seesaw brought cycles of intensely cold winters and easterly winds, then switched abruptly to years of heavy spring and early summer rains, mild winters, and frequent Atlantic storms, or to periods of droughts, light northeasterly winds, and summer heat waves.

## C

Reconstructing the climate changes of the past is extremely difficult, because systematic weather observations began only a few centuries ago, in Europe and North America. Records from India and tropical Africa are even more recent. For the time before records began, we have only 'proxy records' reconstructed largely from tree rings and ice cores, supplemented by a few incomplete written accounts. We now have hundreds of tree-ring records from throughout the northern hemisphere, and many from south of the equator, too, amplified with a growing body of temperature data from ice cores drilled in Antarctica, Greenland, the Peruvian Andes, and other locations. We are close to a knowledge of annual summer and winter temperature variations over much of the northern hemisphere going back 600 years.

## D

This book is a narrative history of climatic shifts during the past ten centuries, and some of the ways in which people in Europe adapted to them. Part One describes the Medieval Warm Period, roughly 900 to 1200.

During these three centuries, Norse voyagers from Northern Europe explored northern seas, settled Greenland, and visited North America. It was not a time of uniform warmth, for then, as always since the Great Ice Age, there were constant shifts in rainfall and temperature. Mean European temperatures were about the same as today, perhaps slightly cooler.

## **E**

It is known that the Little Ice Age cooling began in Greenland and the Arctic in about 1200. As the Arctic ice pack spread southward, Norse voyages to the west were rerouted into the open Atlantic, then ended altogether. Storminess increased in the North Atlantic and the North Sea. Colder, much wetter weather descended on Europe between 1315 and 1319, when thousands perished in a continent-wide famine. By 1400, the weather had become decidedly more unpredictable and stormier, with sudden shifts and lower temperatures that culminated in the cold decades of the late sixteenth century. Fish were a vital commodity in growing towns and cities, where food supplies were a constant concern. Dried cod and herring were already the staples of the European fish trade, but changes in water temperatures forced fishing fleets to work further offshore. The Basques, Dutch, and English developed the first offshore fishing boats adapted to a colder and stormier Atlantic. A gradual agricultural revolution in northern Europe stemmed from concerns over food supplies at a time of rising populations. The revolution involved intensive commercial farming and the growing of animal fodder on land not previously used for crops. The increased productivity from farmland made some countries self-sufficient in grain and livestock and offered effective protection against famine.

## **F**

Global temperatures began to rise slowly after 1850, with the beginning of the Modern Warm Period. There was a vast migration from Europe by land-hungry farmers and others, to which the famine caused by the Irish potato blight contributed, to North America, Australia, New Zealand, and southern Africa. Millions of hectares of forest and woodland fell before the newcomers' axes between 1850 and 1890, as intensive European farming methods expanded across the world. The unprecedented land clearance released vast quantities of carbon dioxide into the atmosphere, triggering for the first time humanly caused global warming. Temperatures climbed more rapidly in the twentieth century as the use of fossil fuels proliferated and greenhouse gas levels continued to soar. The rise has been even steeper since the early 1980s. The Little Ice Age has given way to a new climatic regime, marked by prolonged and steady warming. At the same time, extreme weather events like Category 5 hurricanes are becoming more frequent.

## Questions 14–17

Reading Passage 2 has five paragraphs, A-E.

Choose the correct heading for paragraphs B-E from the list of headings below.

Write the correct number, i-vii, in boxes 14–17 on your answer sheet.

List of Headings

- i Seeking the transmission of radio signals from planets
- ii Appropriate responses to signals from other civilisations
- iii Vast distances to Earth's closest neighbours
- iv Assumptions underlying the search for extra-terrestrial intelligence
- v Reasons for the search for extra-terrestrial intelligence
- vi Knowledge of extra-terrestrial life forms
- vii Likelihood of life on other planets

**Example:**

**Paragraph A    Answer - v**

14 Paragraph B    **iv**

15 Paragraph C    **vii**

16 Paragraph D    **i**

17 Paragraph E    **ii**

# IS THERE ANYBODY OUT THERE?

## The Search for Extra-Terrestrial Intelligence

The question of whether we are alone in the Universe has haunted humanity for centuries, but we may now stand poised on the brink of the answer to that question, as we search for radio signals from other intelligent civilizations. This search is often known by the acronym SETI [search for extraterrestrial intelligence], is a difficult one. Although groups around the world have been searching intermittently for three decades, it is only now that we have reached the level of technology where we can make a determined attempt to search all nearby stars for any sign of life.

### A

The primary reason for the search is basic curiosity – the same curiosity about the natural world that drives all pure science. We want to know whether we are alone in the Universe. We want to know whether life evolves naturally if given the right conditions, or whether there is something very special about the Earth to have fostered the variety of life forms that we see around us on the planet. The simple detection of a radio signal will be sufficient to answer this most basic of all questions. In this sense, SETI is another cog in the machinery of pure science which is continually pushing out the horizon of our knowledge. However, there are other reasons for being interested in whether life exists elsewhere. For example, we have had civilization on Earth for perhaps only a few thousand years, and the threats of nuclear war and pollution over the last few decades have told us that our survival may be tenuous. Will we last another two thousand years or will we wipe ourselves out? Since the lifetime of a planet like ours is several billion years, we can expect that if other civilizations do survive in our galaxy, their ages will range from zero to several billion years. Thus any other civilization that we hear from is likely to be far older on average than ourselves. The mere existence of such a civilization will tell of that long-term survival is possible, and gives us some cause for optimism. It is even possible that the older civilization may pass on the benefits of their experience in dealing with threats to survival such as nuclear war and global pollution, and other threats that we haven't yet discovered

### B

In discussing whether we are alone, most SETI scientists adopt two ground rules. First, UFOs [Unidentified Flying objects] are generally ignored since most scientists don't consider the evidence for them to be strong enough to bear serious consideration (although it is also important to keep an open mind in case any really convincing evidence emerges in the future). Second, we make a very conservative assumption that we are looking for a life form that is pretty well like us, since if it differs radically from us we may well not recognize it as a life form, quite apart from whatever we are able to communicate with it. In other words, the life form we are looking for may well have two green heads and seven fingers, but it will nevertheless resemble us in that it should communicate with its fellows. Be interested in the Universe, Live on a planet orbiting a star like our Sun, and perhaps most restrictively have chemistry, like us, based on carbon and water.

**C**

Even when we make these assumptions, our understanding of other life forms is still severely limited. We do not even know, for example, how many stars have planets, and we certainly do not know how likely it is that life will arise naturally, given the right conditions. However, when we look at the 100 billion stars in our galaxy [the Milky Way], and 100 billion galaxies. In the observable Universe, It seems inconceivable that at least one of these planets does not have a life form on it; in fact, the best educated guess we can make using the little that we do know about the conditions for carbon-based life, leads us to estimate that perhaps one in 100,000 stars might have a life-bearing planet orbiting it. That means that our nearest neighbors are perhaps 1000 light years away, which is almost next door in astronomical terms.

**D**

An alien civilization could choose many different ways of sending information across the galaxy, but many of these either require too much energy, or else are severely attenuated while traversing the vast distances across the galaxy. It turns out that, for a given amount of transmitted power: radio waves in the frequency range 1000 to 3000 MHz travel the greatest distance, and so all searches to date have concentrated on looking for radio waves in this frequency range. So far there have been a number of searches by various groups around the world, including Australian searches using the radio telescope at Parkes, New South Wales. Until now there have not been any detections from the few hundred stars which have been searched. The scale of the searches has been increased dramatically since 1992, when the US Congress voted NASA \$10 million per year for ten years to conduct a thorough search for extra-terrestrial life. Much of the money in this project is being spent on developing the special hardware needed to search many frequencies at once. The project has two parts. One part is a targeted search using the world's largest radio telescopes. The American-operated telescope in Arecibo, Puerto Rico and the French telescope in Nancy in France. This part of the project is searching the nearest 1000 likely stars with a high sensitivity for signals in the frequency range 1000 to 3000 MHz. The other parts of the project is an undirected search which is monitoring all of the space with a lower using the smaller antennas of NASA's Deep Space Network.

**E**

There is considerable debate over how we should react if we detect a signal from an alien civilization. Everybody agrees that we should not reply immediately. Quite apart from the impracticality of sending a reply over such large distances at short notice, it raises a host of ethical questions that would have to be addressed by the global community before any reply could be sent. Would the human race face the culture shock if faced with a superior and much older civilization? Luckily, there is no urgency about this. The stars being searched are hundreds of light years away, so it takes hundreds of years for their signal to reach us, and a further few hundred years for our reply to reach them. It is not important, then, if there's a delay of a few years, or decades, while the human race debates the question of whether to reply and perhaps carefully drafts a reply.

## Questions 27-30

Reading Passage 3 has six paragraphs, A-F.

Choose the correct heading for paragraphs B-E from the list of headings below.

Write the correct number, i-vii, in boxes 27-30 on your answer sheet.

### List of Headings

- i Commercial pressures on people in charge
- ii Mixed views on current changes to museums
- iii Interpreting the facts to meet visitor expectations
- iv The international dimension
- v Collections of factual evidence
- vi Fewer differences between public attractions
- vii Current reviews and suggestions

### Example:

**Paragraph A**    **Answer - v**

27 Paragraph B    **i**

28 Paragraph C    **vi**

29 Paragraph D    **ii**

30 Paragraph E    **v**



# ***The Development of Museums.***

## **A**

The conviction that historical relics provide infallible testimony about the past is rooted in the nineteenth and early twentieth centuries, when science was regarded as objective and value free. As one writer observes: 'Although it is now evident that artifacts are as easily altered as chronicles, public faith in their veracity endures: a tangible relic seems ipso facto real! Such conviction was, until recently, reflected in museum displays. Museums used to look — and some still do — much like storage rooms of objects packed together in showcases: good for scholars who wanted to study the subtle differences in design, but not for the ordinary visitor. to whom It all looked alike. Similarly, the information accompanying the objects often made little sense to the lay visitor. The content and format of explanations dated back to a time when the museum was the exclusive domain of the scientific researcher.

## **B**

Recently, however, attitudes towards history and the way It should be presented have altered. The key word in heritage display is now 'experience the more exciting the better and, if possible, involving all the senses. Good examples of this approach In the UK are the Jorvik Centre in York; the National Museum of Photography, Elm and Television in Bradford; and the imperial War Museum in London. In the US the trend emerged much earlier. Williamsburg has been a prototype for many heritage developments in other parts of the world. No one can predict where the process will end. On so-called heritage sites, the re-enactment of historical events is increasingly popular, and computers will soon provide virtual reality experiences, which will present visitors with a vivid image of the period of their choice, in which they themselves can act as if part of the historical environment. Such developments have been criticised as an intolerable vulgarisation. but the success of many historical theme parks and similar locations suggests that the majority of the public does not share this opinion.

## **C**

In a related development, the sharp distinction between museum and heritage sites on the one hand, and theme parks on the other. is gradually evaporating. They already borrow ideas and concepts from one another. For example, museums have adopted storylines for exhibitions, sites have accepted 'theming' as a relevant tool, and theme parks are moving towards more authenticity and research-based presentations in zoos, animals are no longer kept in cages, but in great spaces, either In the open air or in enormous greenhouses, such as the jungle and desert environments .In Burgers' Zoo In Holland. This particular trend is regarded as one of the major developments in the presentation of natural history in the twentieth century.



## D

Theme parks are undergoing other changes, too, as they try to present more serious social and cultural issues, and move away from fantasy. This development is a response to market forces and, although museums and heritage sites have a special, rather distinct, role to fulfil, they are also operating in a very competitive environment, where visitors make choices on how and where to spend their free time. Heritage and museum experts do not have to invent stories and recreate historical environments to attract their visitors: their assets are already in place. However, exhibits must be both based on artefacts and facts as we know them, and attractively presented. Those who are professionally engaged in the art of interpreting history are thus in a difficult position, as they must steer a narrow course between the demands of 'evidence' and 'attractiveness' especially given the increasing need in the heritage industry for income generating activities.

## E

It could be claimed that in order to make everything in heritage more 'real' historical accuracy must be increasingly altered. For example, *Pithecanthropus erectus* is depicted in an Indonesian museum with Malay facial features, because this corresponds to public perceptions. Similarly, in the Museum of Natural History in Washington, Neanderthal man is shown making a dominant gesture to his wife. Such presentations tell us more about contemporary perceptions of the world than about our ancestors. There is one compensation, however, for the professionals who make these interpretations: If they did not provide the interpretation, visitors would do it for themselves, based on their own ideas, misconceptions and prejudices. And no matter how exciting the result, it would contain a lot more bias than the presentations provided by experts.

## F

Human bias is inevitable, but another source of bias in the representation of history has to do with the transitory nature of the materials themselves. The simple fact is that not everything from history survives the historical process. Castles, palaces and cathedrals have a longer lifespan than the dwellings of ordinary people. The same applies to the furnishing and other contents of the premises. In a town like Leyden in Holland, which in the seventeenth century was occupied by approximately the same number of inhabitants as today, people lived within the walled town, an area more than five times smaller than modern Leyden. In most of the houses, several families lived together in circumstances beyond our imagination. Yet in museums, line period rooms give only an image of the lifestyle of the upper class of that era. No wonder that people who stroll around exhibitions are filled with nostalgia; the evidence in museums indicates that life was so much better in the past. This notion is induced by the bias in its representation in museums and heritage centers.

## Questions 14-20

Reading Passage 2 has seven paragraphs, A-G.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, i-ix, in boxes 14-20 on your answer sheet.

### List of Headings

- i Evidence of innovative environment management practices
- ii An undisputed answer to a question about the moai
- iii The future of the moai statues
- iv A theory which supports a local belief
- v The future of Easter Island
- vi Two opposing views about the Rapanui people
- vii Destruction outside the inhabitants' control
- viii How the statues made a situation worse
- ix Diminishing food resources

14 Paragraph A    **ii**

15 Paragraph B    **ix**

16 Paragraph C    **viii**

17 Paragraph D    **i**

18 Paragraph E    **iv**

19 Paragraph F    **vii**

20 Paragraph G    **vi**

# What destroyed the civilisation of Easter Island?

## A

Easter Island, or Rapa Nui as it is known locally, is home to several hundred ancient human statues – the moai. After this remote Pacific island was settled by the Polynesians, it remained isolated for centuries. All the energy and resources that went into the moai – some of which are ten metres tall and weigh over 7,000 kilos – came from the island itself. Yet when Dutch explorers landed in 1722, they met a Stone Age culture. The moai were carved with stone tools, then transported for many kilometres, without the use of animals or wheels, to massive stone platforms. The identity of the moai builders was in doubt until well into the twentieth century. Thor Heyerdahl, the Norwegian ethnographer and adventurer, thought the statues had been created by pre-Inca peoples from Peru. Bestselling Swiss author Erich von Daniken believed they were built by stranded extraterrestrials. Modern science – linguistic, archaeological and genetic evidence – has definitively proved the moai builders were Polynesians, but not how they moved their creations. Local folklore maintains that the statues walked, while researchers have tended to assume the ancestors dragged the statues somehow, using ropes and logs.

## B

When the Europeans arrived, Rapa Nui was grassland, with only a few scrawny trees. In the 1970s and 1980s, though, researchers found pollen preserved in lake sediments, which proved the island had been covered in lush palm forests for thousands of years. Only after the Polynesians arrived did those forests disappear. US scientist Jared Diamond believes that the Rapanui people – descendants of Polynesian settlers – wrecked their own environment. They had unfortunately settled on an extremely fragile island – dry, cool, and too remote to be properly fertilised by windblown volcanic ash. When the islanders cleared the forests for firewood and farming, the forests didn't grow back. As trees became scarce and they could no longer construct wooden canoes for fishing, they ate birds. Soil erosion decreased their crop yields. Before Europeans arrived, the Rapanui had descended into civil war and cannibalism, he maintains. The collapse of their isolated civilisation, Diamond writes, is a 'worst-case scenario for what may lie ahead of us in our own future'.

## C

The moai, he thinks, accelerated the self-destruction. Diamond interprets them as power displays by rival chieftains who, trapped on a remote little island, lacked other ways of asserting their dominance. They competed by building ever bigger figures. Diamond thinks they laid the moai on wooden sledges, hauled over log rails, but that required both a lot of wood and a lot of people. To feed the people, even more land had to be cleared. When the wood was gone and civil war began, the islanders began toppling the moai. By the nineteenth century none were standing.

## D

Archaeologists Terry Hunt of the University of Hawaii and Carl Lipo of California State University agree that Easter Island lost its lush forests and that it was an 'ecological catastrophe' – but they believe the islanders themselves weren't to blame. And the moai certainly weren't. Archaeological excavations indicate that the Rapanui went to heroic efforts to protect the resources of their wind-lashed, infertile fields. They built thousands of circular stone windbreaks and gardened inside them, and used broken volcanic rocks to keep the soil moist. In short, Hunt and Lipo argue, the prehistoric Rapanui were pioneers of sustainable farming.

## E

Hunt and Lipo contend that moai-building was an activity that helped keep the peace between islanders. They also believe that moving the moai required few people and no wood, because they were walked upright. On that issue, Hunt and Lipo say, archaeological evidence backs up Rapanui folklore. Recent experiments indicate that as few as 18 people could, with three strong ropes and a bit of practice, easily manoeuvre a 1,000 kg moai replica a few hundred metres. The figures' fat bellies tilted them forward, and a D-shaped base allowed handlers to roll and rock them side to side.

## F

Moreover, Hunt and Lipo are convinced that the settlers were not wholly responsible for the loss of the island's trees. Archaeological finds of nuts from the extinct Easter Island palm show tiny grooves, made by the teeth of Polynesian rats. The rats arrived along with the settlers, and in just a few years, Hunt and Lipo calculate, they would have overrun the island. They would have prevented the reseedling of the slow-growing palm trees and thereby doomed Rapa Nui's forest, even without the settlers' campaign of deforestation. No doubt the rats ate birds' eggs too. Hunt and Lipo also see no evidence that Rapanui civilisation collapsed when the palm forest did. They think its population grew rapidly and then remained more or less stable until the arrival of the Europeans, who introduced deadly diseases to which islanders had no immunity. Then in the nineteenth century slave traders decimated the population, which shrivelled to 111 people by 1877.

## G

Hunt and Lipo's vision, therefore, is one of an island populated by peaceful and ingenious moai builders and careful stewards of the land, rather than by reckless destroyers ruining their own environment and society. 'Rather than a case of abject failure, Rapa Nui is an unlikely story of success', they claim. Whichever is the case, there are surely some valuable lessons which the world at large can learn from the story of Rapa Nui.

## Questions 27-32

Reading Passage 3 has six paragraphs, A-F.

Choose the correct heading for paragraphs A-F from the list of headings below.

Write the correct number, -vii, in boxes 27-32 on your answer sheet

### List of Headings

- i Differences between languages highlight their impressiveness
- ii The way in which a few sounds are organised to convey a huge range of meaning
- iii Why the sounds used in different languages are not identical
- iv Apparently incompatible characteristics of language
- v Even silence can be meaningful
- vi Why language is the most important invention of all
- vii The universal ability to use language

27 Paragraph A      **vi**

28 Paragraph B      **iv**

29 Paragraph C      **ii**

30 Paragraph D      **vii**

31 Paragraph E      **i**

32 Paragraph F      **v**

# ***'This Marvellous Invention'***

**A.**

Of all mankind's manifold creations, language must take pride of place. Other inventions - the wheel, agriculture, sliced bread - may have transformed our material existence, but the advent of language is what made us human. Compared to language, all other inventions pale in significance, since everything we have ever achieved depends on language and originates from it. Without language, we could never have embarked on our ascent to unparalleled power over all other animals, and even over nature itself.

**B.**

But language is foremost not just because it came first. In its own right it is a tool of extraordinary sophistication, yet based on an idea of ingenious simplicity: 'this marvellous invention of composing out of twenty-five or thirty sounds that infinite variety of expressions which, whilst having in themselves no likeness to what is in our mind, allow us to disclose to others its whole secret, and to make known to those who cannot penetrate it all that we imagine, and all the various stirrings of our soul' This was how, in 1660, the renowned French grammarians of the Port-Royal abbey near Versailles distilled the essence of language, and no one since has celebrated more eloquently the magnitude of its achievement. Even so, there is just one flaw in all these hymns of praise, for the homage to language's unique accomplishment conceals a simple yet critical incongruity. Language is mankind's greatest invention - except, of course, that it was never invented. This apparent paradox is at the core of our fascination with language, and it holds many of its secrets.

**C.**

Language often seems so skillfully drafted that one can hardly imagine it as anything other than the perfected handiwork of a master craftsman. How else could this instrument make so much out of barely three dozen measly morsels of sound? In themselves, these configurations of mouth p, f, b, v, t, d, k, g, sh, a, e and so on - amount to nothing more than a few haphazard spits and splutters, random noises with no meaning, no ability to express, no power to explain. But run them through the cogs and wheels of the language machine, let it arrange them in some very special orders, and there is nothing that these meaningless streams of air cannot do: from signing the interminable boredom of existence to unravelling the fundamental order of the universe.

**D.**

the most extraordinary thing about language, however, is that one doesn't have to be a genius to set its wheels in motion. The language machine allows just about everybody from pre-modern foragers in the subtropical savannah, to post-modern philosophers in the suburban sprawl - to tie these meaningless sounds together into an infinite variety of subtle senses, and all apparently without the slightest exertion. Yet it is precisely this deceptive ease which makes language a victim of its own success, since in everyday life its triumphs are usually taken for granted. The wheels of language run so smoothly that one rarely bothers to stop and think about all the resourcefulness and expertise that must have gone into making it tick. Language conceals art.



## E.

Often, it is only the estrangement of foreign tongues, with their many exotic and outlandish features, that brings home the wonder of languages design. One of the showiest stunts that some languages can pull off is an ability to build up words of breath-breaking length, and thus express in one word what English takes a whole sentence to say. The Turkish word *çehirliliğitimediklerimizdensiniz*, to take one example, means nothing less than 'you are one of those whom we can't turn into a town-dweller'. (In case you were wondering, this monstrosity really is one word, not merely many different words squashed together – most of its components cannot even stand up on their own.)

## F.

And if that sounds like some one-off freak, then consider Sumerian, the language spoken on the banks of the Euphrates some 5,000 years ago by the people who invented writing and thus enabled the documentation of history. A Sumerian word like *munintuma'a* ('when he had made it suitable for her') might seem rather trim compared to the Turkish colossus above. What is so impressive about it, however, is not its lengthiness but rather the reverse – the thrifty compactness of its construction. The word is made up of different slots, each corresponding to a particular portion of meaning. This sleek design allows single sounds to convey useful information, and in fact, even the absence of a sound has been enlisted to express something specific. If you were to ask which bit in the Sumerian word corresponds to the pronoun 'it' in the English translation 'when he had made it suitable for her', then the answer would have to be nothing. Mind you, a very particular kind of nothing: the nothing that stands in the empty slot in the middle. The technology is so fine-tuned then that even a non-sound, when carefully placed in a particular position, has been invested with a specific function. Who could possibly have come up with such a nifty contraption?



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## Questions 27-32

Reading Passage 3 has six sections, A-F.

Choose the correct heading for each section from the list of headings below.

Write the correct number, i-viii, in boxes 27-32 on your answer sheet.

### List of Headings

- i Courses that require a high level of commitment
- ii A course title with two meanings
- iii The equal importance of two key issues
- IV Applying a theory in an unexpected context
- V The financial benefits of studying
- vi A surprising course title
- vii Different names for different outcomes
- viii The possibility of attracting the wrong kind of student

27 Section A **vi**

28 Section B **viii**

29 Section C **ii**

30 Section D **iv**

31 Section E **iii**

32 Section F **vii**

# What's the purpose of gaining knowledge?

**A**

'I would found an institution where any person can find instruction in any subject' That was the founder's motto for Cornell University, and it seems an apt characterization of the different university, also in the USA, where I currently teach philosophy. A student can prepare for a career in resort management, engineering, interior design, accounting, music, law enforcement, you name it. But what would the founders of these two institutions have thought of a course called Arson for Profit? I kid you not: we have it on the books. Any undergraduates who have met the academic requirements can sign up for the course in our program in 'fire science'.

**B**

Naturally, the course is intended for prospective arson investigators, who can learn all the tricks of the trade for detecting whether a fire was deliberately set, discovering who did it, and establishing a chain of evidence for effective prosecution in a court of law. But wouldn't this also be the perfect course for prospective arsonists to sign up for? My point is not to criticize academic programs in fire science: they are highly welcome as part of the increasing professionalization of this and many other occupations. However, it's not unknown for a firefighter to torch a building. This example suggests how dishonest and illegal behavior, with the help of higher education, can creep into every aspect of public and business life.

**C**

I realized this anew when I was invited to speak before a class in marketing, which is another of our degree programs. The regular instructor is a colleague who appreciates the kind of ethical perspective I can bring as a philosopher. There are endless ways I could have approached this assignment, but I took my cue from the title of the course: 'Principles of Marketing'. It made me think to ask the students, 'Is marketing principled?' After all, a subject matter can have principles in the sense of being codified, having rules, as with football or chess, without being principled in the sense of being ethical. Many of the students immediately assumed that the answer to my question about marketing principles was obvious: no. Just look at the ways in which everything under the sun has been marketed; obviously, it need not be done in a principled (=ethical) fashion.

**D**

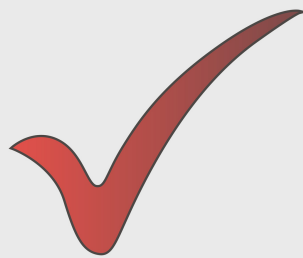
Is that obvious? I made the suggestion, which may sound downright crazy in light of the evidence, that perhaps marketing is by definition principled. My inspiration for this judgement is the philosopher Immanuel Kant, who argued that any body of knowledge consists of an end (or purpose) and a means.

## E

Let us apply both the terms 'means' and 'end' to marketing. The students have signed up for a course in order to learn how to market effectively. But to what end? There seem to be two main attitudes toward that question. One is that the answer is obvious: the purpose of marketing is to sell things and to make money. The other attitude is that the purpose of marketing is irrelevant: Each person comes to the program and course with his or her own plans, and these need not even concern the acquisition of marketing expertise as such. My proposal, which I believe would also be Kant's, is that neither of these attitudes captures the significance of the end to the means for marketing. A field of knowledge or a professional endeavor is defined by both the means and the end; hence both deserve scrutiny. Students need to study both how to achieve X, and also what X is.

## F

It is at this point that 'Arson for Profit' becomes supremely relevant. That course is presumably all about means: how to detect and prosecute criminal activity. It is therefore assumed that the end is good in an ethical sense. When I ask fire science students to articulate the end, or purpose, of their field, they eventually generalize to something like, 'The safety and welfare of society,' which seems right. As we have seen, someone could use the very same knowledge of means to achieve a much less noble end, such as personal profit via destructive, dangerous, reckless activity. But we would not call that firefighting. We have a separate word for it: arson. Similarly, if you employed the 'principles of marketing' in an unprincipled way, you would not be doing marketing. We have another term for it: fraud. Kant gives the example of a doctor and a poisoner, who use the identical knowledge to achieve their divergent ends. We would say that one is practicing medicine, the other, murder.



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**Questions 14-20**

Reading Passage 2 has seven paragraphs, A-G

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, i-viii, in boxes 14-20 on your answer sheet.

**List of Headings**

- i Different accounts of the same journey
- ii Bingham gains support
- iii A common belle
- iv The aim of the trip
- v A dramatic description
- vi A new route
- vii Bingham publishes his theory
- viii Bingham's lack of enthusiasm

- |                |      |
|----------------|------|
| 14 Paragraph A | iv   |
| 15 Paragraph B | vi   |
| 16 Paragraph C | viii |
| 17 Paragraph D | v    |
| 18 Paragraph E | i    |
| 19 Paragraph F | vii  |
| 20 Paragraph G | iii  |

# The Lost City

An explorer's encounter with the ruined city of Machu Picchu, the most famous icon of the Inca civilisation

## A

When the US explorer and academic Hiram Bingham arrived in South America in 1911, he was ready for what was to be the greatest achievement of his life: the exploration of the remote hinterland to the west of Cusco, the old capital of the Inca empire in the Andes mountains of Peru. His goal was to locate the remains of a city called Vitcos, the last capital of the Inca civilisation. Cusco lies on a high plateau at an elevation of more than 3,000 metres, and Bingham's plan was to descend from this plateau along the valley of the Urubamba river, which takes a circuitous route down to the Amazon and passes through an area of dramatic canyons and mountain ranges.

## B

When Bingham and his team set off down the Urubamba in late July, they had an advantage over travellers who had preceded them: a track had recently been blasted down the valley canyon to enable rubber to be brought up by mules from the jungle. Almost all previous travellers had left the river at Ollantaytambo and taken a high pass across the mountains to rejoin the river lower down, thereby cutting a substantial corner, but also therefore never passing through the area around Machu Picchu.

## C

On 24 July they were a few days into their descent of the valley. The day began slowly, with Bingham trying to arrange sufficient mules for the next stage of the trek. His companions showed no interest in accompanying him up the nearby hill to see some ruins that a local farmer, Melchor Arteaga, had told them about the night before. The morning was dull and damp, and Bingham also seems to have been less than keen on the prospect of climbing the hill. In his book *Lost City of the Incas*, he relates that he made the ascent without having the least expectation that he would find anything at the top.

## D

Bingham writes about the approach in vivid style in his book. First, as he climbs up the hill, he describes the ever-present possibility of deadly snakes, 'capable of making considerable springs when in pursuit of their prey'; not that he sees any. Then there's a sense of mounting discovery as he comes across great sweeps of terraces, then a mausoleum, followed by monumental staircases and, finally, the grand ceremonial buildings of Machu Picchu. 'It seemed like an unbelievable dream the sight held me spellbound', he wrote.

## E

We should remember, however, that *Lost City of the Incas* is a work of hindsight, not written until 1948, many years after his journey. His journal entries of the time reveal a much more gradual appreciation of his achievement. He spent the afternoon at the ruins noting down the dimensions of some of the buildings, then descended and rejoined his companions, to whom he seems to have said little about his discovery.

At this stage, Bingham didn't realise the extent or the importance of the site, nor did he realise what use he could make of the discovery.

**F**

However, soon after returning it occurred to him that he could make a name for himself from this discovery. When he came to write the National Geographic magazine article that broke the story to the world in April 1913, he knew he had to produce a big idea.

He wondered whether it could have been the birthplace of the very first Inca, Manco the Great, and whether it could also have been what chroniclers described as 'the last city of the Incas'. This term refers to Vilcabamba the settlement where the Incas had fled from Spanish invaders in the 1530s. Bingham made desperate attempts to prove this belief for nearly 40 years. Sadly, his vision of the site as both the beginning and end of the Inca civilisation, while a magnificent one, is inaccurate. We now know, that Vilcabamba actually lies 65 kilometres away in the depths of the jungle.

**G**

One question that has perplexed visitors, historians and archaeologists alike ever since Bingham, is why the site seems to have been abandoned before the Spanish Conquest. There are no references to it by any of the Spanish chroniclers – and if they had known of its existence so close to Cusco they would certainly have come in search of gold.

An idea which has gained wide acceptance over the past few years is that Machu Picchu was a moya, a country estate built by an Inca emperor to escape the cold winters of Cusco, where the elite could enjoy monumental architecture and spectacular views. Furthermore, the particular architecture of Machu Picchu suggests that it was constructed at the time of the greatest of all the Incas, the emperor Pachacuti (1438-71). By custom, Pachacuti's descendants built other similar estates for their own use, and so Machu Picchu would have been abandoned after his death, some 50 years before the Spanish Conquest.



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## Questions 1-7

Reading Passage 1 has seven paragraphs, A-G.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, i-viii, in boxes 1-7 on your answer sheet.

### List of Headings

- i The importance of getting the timing right
- ii Young meets old
- iii Developments to the disadvantage of tortoise populations
- iv Planning a bigger idea
- v Tortoises populate the islands
- vi Carrying out a carefully prepared operation
- vii Looking for a home for the islands' tortoises
- viii The start of the conservation project

1 Paragraph A    **v**

2 Paragraph B    **iii**

3 Paragraph C    **viii**

4 Paragraph D    **i**

5 Paragraph E    **iv**

6 Paragraph F    **vi**

7 Paragraph G    **ii**



# Flying Tortoises

An airborne reintroduction programme has helped conservationists take significant steps to protect the endangered Galapagos tortoise.

## A

Forests of spiny cacti cover much of the uneven lava plains that separate the interior of the Galapagos island of Isabela from the Pacific Ocean. With its five distinct volcanoes, the island resembles a lunar landscape. Only the thick vegetation at the skirt of the often cloud-covered peak of Sierra Negra offers respite from the barren terrain below.

This inhospitable environment is home to the giant Galapagos tortoise. Some time after the Galapagos's birth, around five million years ago, the islands were colonised by one or more tortoises from mainland South America. As these ancestral tortoises settled on the individual islands, the different populations adapted to their unique environments, giving rise to at least 14 different subspecies. Island life agreed with them. In the absence of significant predators, they grew to become the largest and longest-living tortoises on the planet, weighing more than 400 kilograms, occasionally exceeding 1,8 metres in length and living for more than a century.

## B

Before human arrival, the archipelago's tortoises numbered in the hundreds of thousands. From the 17th century onwards, pirates took a few on board for food, but the arrival of whaling ships in the 1790s saw this exploitation grow exponentially. Relatively immobile and capable of surviving for months without food or water, the tortoises were taken on board these ships to act as food supplies during long ocean passages. Sometimes, their bodies were processed into high-grade oil.

In total, an estimated 200,000 animals were taken from the archipelago before the 20th century. This historical exploitation was then exacerbated when settlers came to the islands. They hunted the tortoises and destroyed their habitat to clear land for agriculture. They also introduced alien species – ranging from cattle, pigs, goats, rats and dogs to plants and ants – that either prey on the eggs and young tortoises or damage or destroy their habitat.

## C

Today, only 11 of the original subspecies survive and of these, several are highly endangered. In 1989, work began on a tortoise-breeding centre just outside the town of Puerto Villamil on Isabela, dedicated to protecting the island's tortoise populations. The centre's captive-breeding programme proved to be extremely successful, and it eventually had to deal with an overpopulation problem.

## D

The problem was also a pressing one. Captive-bred tortoises can't be reintroduced into the wild until they're at least five years old and weigh at least 4,5 kilograms, at which point their size and weight – and their hardened shells – are sufficient to protect them from predators. But if people wait too long after that point, the tortoises eventually become too large to transport.

## E

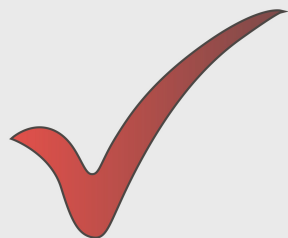
For years, repatriation efforts were carried out in small numbers, with the tortoises carried on the backs of men over weeks of long, treacherous hikes along narrow trails. But in November 2010, the environmentalist and Galapagos National Park liaison officer Godfrey Merlin, a visiting private motor yacht captain and a helicopter pilot gathered around a table in a small cafe in Puerto Ayora on the island of Santa Cruz to work out more ambitious reintroduction. The aim was to use a helicopter to move 300 of the breeding centre's tortoises to various locations close to Sierra Negra.

## F

This unprecedented effort was made possible by the owners of the 67-metre yacht White Cloud, who provided the Galapagos National Park with free use of their helicopter and its experienced pilot, as well as the logistical support of the yacht, its captain and crew. Originally an air ambulance, the yacht's helicopter has a rear double door and a large internal space that's well suited for cargo, so a custom crate was designed to hold up to 33 tortoises with a total weight of about 150 kilograms. This weight, together with that of the fuel, pilot and four crew, approached the helicopter's maximum payload, and there were times when it was clearly right on the edge of the helicopter's capabilities. During a period of three days, a group of volunteers from the breeding centre worked around the clock to prepare the young tortoises for transport. Meanwhile, park wardens, dropped off ahead of time in remote locations, cleared landing sites within the thick brush, cacti and lava rocks.

## G

Upon their release, the juvenile tortoises quickly spread out over their ancestral territory, investigating their new surroundings and feeding on the vegetation. Eventually, one tiny tortoise came across a fully grown giant who had been lumbering around the island for around a hundred years. The two stood side by side, a powerful symbol of the regeneration of an ancient species.



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## Questions 27-33

Reading Passage 3 has seven paragraphs, A-G.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, i-viii, in boxes 27-33 on your answer sheet

### List of Headings

- i Disputes over financial arrangements regarding senior managers
- ii The impact on companies of being subjected to close examination
- iii The possible need to fundamental change in every area of business
- iv Many external bodies being held responsible for problems
- v The falling number of board members with broad enough experience
- vi A risk that not all directors take part in solving major problems
- vii Boards not looking far enough ahead
- viii A proposal to change the way the board operates

27 Paragraph A      **iv**

28 Paragraph B      **ii**

29 Paragraph C      **vi**

30 Paragraph D      **viii**

31 Paragraph E      **vii**

32 Paragraph F      **i**

33 Paragraph G      **iii**

# UK companies need more effective boards of directors

## A.

After a number of serious failures of governance (that is, how they are managed at the highest level), companies in Britain, as well as elsewhere, should consider radical changes to their directors' roles. It is clear that the role of a board director today is not an easy one. Following the 2008 financial meltdown, which resulted in a deeper and more prolonged period of economic downturn than anyone expected, the search for explanations in the many post-mortems of the crisis has meant blame has been spread far and wide. Governments, regulators, central banks and auditors have all been in the frame. The role of bank directors and management and their widely publicised failures have been extensively picked over and examined in reports, inquiries and commentaries.

## B.

The knock-on effect of this scrutiny has been to make the governance of companies in general an issue of intense public debate and has significantly increased the pressures on, and the responsibilities of, directors. At the simplest and most practical level, the time involved in fulfilling the demands of a board directorship has increased significantly, calling into question the effectiveness of the classic model of corporate governance by part-time, independent non-executive directors. Where once a board schedule may have consisted of between eight and ten meetings a year, in many companies the number of events requiring board input and decisions has dramatically risen. Furthermore, the amount of reading and preparation required for each meeting is increasing. Agendas can become overloaded and this can mean the time for constructive debate must necessarily be restricted in favour of getting through the business.

## C.

Often, board business is devolved to committees in order to cope with the workload, which may be more efficient but can mean that the board as a whole is less involved in fully addressing some of the most important issues. It is not uncommon for the audit committee meeting to last longer than the main board meeting itself. The process may take the place of discussion and be at the expense of real collaboration, so that boxes are ticked rather than issues tackled.

## D.

A radical solution, which may work for some very large companies whose businesses are extensive and complex, is the professional board, whose members would work up to three or four days a week, supported by their own dedicated staff and advisers. There are obvious risks to this and it would be important to establish clear guidelines for such a board to ensure that it did not step on the toes of management by becoming too engaged in the day-to-day running of the company. Problems of recruitment, remuneration and independence could also arise and this structure would not be appropriate for all companies.

However, more professional and better-informed boards would have been particularly appropriate for banks where the executives had access to information that part-time non-executive directors lacked, leaving the latter unable to comprehend or anticipate the 2008 crash.

**E.**

One of the main criticisms of boards and their directors is that they do not focus sufficiently on longer-term matters of strategy, sustainability and governance, but instead concentrate too much on short-term financial metrics. Regulatory requirements and the structure of the market encourage this behaviour. The tyranny of quarterly reporting can distort board decision-making, as directors have to 'make the numbers' every four months to meet the insatiable appetite of the market for more data. This serves to encourage the trading methodology of a certain kind of investor who moves in and out of a stock without engaging in constructive dialogue with the company about strategy or performance, and is simply seeking a short-term financial gain. This effect has been made worse by the changing profile of investors due to the globalisation of capital and the increasing use of automated trading systems. Corporate culture adapts and management teams are largely incentivised to meet financial goals.

**F.**

Compensation for chief executives has become a combat zone where pitched battles between investors, management and board members are fought, often behind closed doors but increasingly frequently in the full glare of press attention. Many would argue that this is in the interest of transparency and good governance as shareholders use their muscle in the area of pay to pressure boards to remove underperforming chief executives. Their powers to vote down executive remuneration policies increased when binding votes came into force. The chair of the remuneration committee can be an exposed and lonely role, as Alison Carnwath, chair of Barclays Bank's remuneration committee, found when she had to resign, having been roundly criticised for trying to defend the enormous bonus to be paid to the chief executive; the irony being that she was widely understood to have spoken out against it in the privacy of the committee.

**G.**

The financial crisis stimulated a debate about the role and purpose of the company and a heightened awareness of corporate ethics. Trust in the corporation has been eroded and academics such as Michael Sandel, in his thoughtful and bestselling book *What Money Can't Buy*, are questioning the morality of capitalism and the market economy. Boards of companies in all sectors will need to widen their perspective to encompass these issues and this may involve a realignment of corporate goals. We live in challenging times.